



# JANNAF

## ROCKET NOZZLE TECHNOLOGY SUBCOMMITTEE

### EXECUTIVE COMMITTEE REPORT

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November 19, 2002



# TSG and Panels



## TECHNICAL STEERING GROUP

T. Lawrence, NASA/MSFC (Chairman)  
S. Burroughs, AMCOM  
S. Florian, NAWCWD  
G. Harting, AFRL/EAFB

C. Lopez, Navy SSP  
M. Opeka, NSWC/Carderock  
Vacant, NASA  
Vacant, Army  
Vacant, Air Force

**Executive Committee Liaison**  
S. Richards, NASA/MSFC

PANELS

**CPIA Representative**  
M. Coleman, CPIA

**Processing Science  
and Materials**  
S. Brown, SoRI

**Nozzle Analysis  
and Modeling**  
L. Clayton, NASA/MSFC

**Nozzle Control Systems**  
J. Bratcher, NAWCWD



# Processing Science and Materials Panel



- Purpose
- Improve nozzle quality and consistency through:
  - Improved materials, material properties, and process understanding
  - Advocating work to establish standardized test methods and material and processing databases
- Material Obsolescence
  - Identify critical nozzle manufacturing material shortages and recommend corrective action



# Processing Science and Materials Panel



- Activities

- Sponsored a workshop on the status of rayon replacement efforts within the industry, November 2001
- Held panel meeting at RNTS meeting. Panel membership being updated and task being modified to encompass noneroding throat materials
- Future Plans
  - Sponsor another workshop on the status of rayon replacement efforts within industry - Fall 2003
  - Continue to promote reporting to JANNAF of composite materials research potentially applicable to nozzles



## Nozzle Design, Test and Evaluation Panel



- Purpose
  - Provide capture of historical knowledge from leading industry experts in the Legacy session at the subcommittee meetings
  - Promote tasks, technologies, and materials needed to meet IHPRPT goals
- Activities
  - Coordinated the Legacy session at the RNTS meeting in August, 2002 – 4 Presentations
  - Held Panel meeting at RNTS meeting. Panel membership being updated to active participants



## Nozzle Design, Test and Evaluation Panel



- Future Plans

- Establish speakers for next RNTS Legacy Session and document the information
- Continue to watch IHPRPT program for nozzle technology areas not addressed and raise those issues
- Work closely with Processing Science and Materials Panel to assist adaptation of new materials into nozzle designs



## Nozzle Analysis and Modeling Panel



- Purpose

- Promote development of new analysis methods for modeling the thermal, structural, and thermosstructural behavior of nozzle material
- Advance the characterization of nozzle environments considering mixed mode heat transfer, reactive boundary layer chemistry, and two phase particle impingement effects



## Nozzle Analysis and Modeling Panel



- Activities
  - New Co-Chairs named to head panel: Louie Clayton and Eric Poole from MSFC
  - Task rewritten
- Future Plans
  - Update panel membership
  - New panel have telecons to initiate discussion and establish direction
  - Convene panel at next RNTS meeting in May 2004



## Nozzle Control Systems Panel



- Purpose

- To disseminate technical information relative to ongoing and planned research in government, university, and industry on Thrust Vector Control (TVC), Thrust Magnitude Control (TMC), and Thrust Vector Actuation (TVA) systems, and to better focus these efforts by identifying key research area needs

- Activities

- Addressing two tasks: Low cost, Light Weight, Quick Response Propulsion Control Systems, and Thrust Management Control Technology Review
- Sponsored a Workshop on Flowfield and Sideload Modeling of the Staging Event



## Nozzle Control Systems Panel



- Future Plans

- Participate in IHPRPT Controls efforts and promote dissemination of technology developments within the nozzle control system community
- Update Panel membership and hold a panel meeting at the next RNTS meeting in May 2004



## Meetings



- **22<sup>nd</sup> RNTS meeting**
  - August 27-29, 2002 in San Antonio, TX
  - Joint meeting with NDES and S&MBS
  - 3 Panel meetings
  - 19 RNTS technical papers in 4 sessions
  - 17 Technical papers in 3 RNTS/S&MBS joint sessions
  - 4 Presentations in RNTS Legacy Session
  - 129 Attendees



## Workshops



- Rayon Replacement Workshop
  - November 15-16, 2001 in Huntsville, AL
  - Objectives:
    - Provide a status of rayon replacement efforts
    - Determine if U.S. needs are being met
    - Suggest additional actions that need to be taken
  - 11 Presentations
    - Snecma Moteurs, France opened meeting with a status on their carbonizable rayon
  - Splinter groups discussed issues and strategies with rayon and other obsolescence issues
  - 46 Attendees



## Workshops



- **Flowfield and Sideload Modeling of the Staging Event Workshop**
  - July 7, 2002 in Indianapolis, IN
  - Objectives:
    - Summarize experience with different flowfield models
    - Identify all available measured data
  - 8 Presentations
  - 22 Attendees



## Publications



- RNTS 2001 Subcommittee Activity Report, October 2001
- JANNAF Rocket Nozzle Technology Subcommittee Rayon Replacement Workshop Proceedings, JSC CD-10  
Publication date November 2001
- August 2002 NDES/RNTS/S&MBS Joint Subcommittee Meeting Proceedings, JSC-16, Publication date November 2002



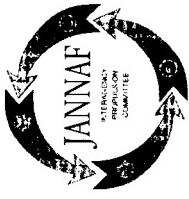
## Issues



- 33 Abstracts received only 19 Papers, much due to industry cutbacks in support
- Fill three existing TSG vacancies Army, AF, NASA (plan to submit name within a month)



## Recommendations



- Continue RNTS for next 18 months
- Hold a workshop on rayon replacement progress in Fall of 2003
- Evaluate potential for workshop on other material obsolescence issues
- CPIA prepare a technology and program review article on thrust magnitude control
- CPIA update the 2001 literature search on power usage characteristics for thrust vectoring systems